WHAT IS CLAIMED IS:

1. An apparatus for separating undesired material from coal comprising:

an air swept pulverizer for breaking up coal into particles where the pulverizer is a hammer mill, bowl mill, roller mill, or ring/roller mill; and

a separation mechanism connected to the pulverizer for separating undesired material from coal.

2. An apparatus as described in Claim 1 wherein the pulverizer includes a feed mechanism which introduces coal into the pulverizer.

3. An apparatus as described in Claim 2 wherein the pulverizer includes an air blower which introduces flowing air into the pulverizer.

4. An apparatus as described in Claim 3 wherein the pulverizer includes a removal mechanism which removes undesired material and coal of an undesired size from the pulverizer.

5. An apparatus as described in Claim 4 wherein the separation mechanism includes a conveyor which carries undesired material and coal of an undesired size from the removal mechanism.

6. An apparatus as described in Claim 5 including a mechanism for returning cleaned coal from the separation mechanism back to the pulverizer for additional grinding.

7. An apparatus as described in Claim 6 including a mechanism for diversion of material removed from the pulverizer directly to refuse without going to the separation mechanism.

8. An apparatus as described in Claim 7 wherein the separation mechanism includes a surge bin disposed adjacent the conveyor into which the undesired material and coal of an undesired size is deposited from the conveyor.

9. An apparatus as described in Claim 8 wherein the pulverizer includes a grinding chamber.

10. An apparatus as described in Claim 9 wherein the pulverizer includes intermediate openings through which the removal mechanism removes undesired material and coal of an undesired size from the pulverizer.

11. An apparatus as described in Claim 10 wherein the pulverizer has a complete opening from which coal of a desired particle size leaves the pulverizer.

12. An apparatus as described in Claim 11 wherein the pulverizer includes a base and the removal mechanism includes a screw conveyor connected to the base.

13. An apparatus as described in Claim 12 wherein the pulverizer includes a particle size classifier.

14. An apparatus as described in Claim 13 wherein the cone includes kick-out door mechanisms through which material can be removed from the cone.

15. An apparatus as described in Claim 14 wherein the separation mechanism includes a screen disposed under the surge bin for screening material.

16. An apparatus as described in Claim 15 wherein the separation mechanism includes a vibrating feeder disposed under the screen on which material is deposited after passing through the screen.

17. An apparatus as described in Claim 16 including a mechanism for directly rejecting the oversize from the screen or sending back to the pulverizer.

18. An apparatus as described in Claim 17 wherein the separation mechanism includes an electric and magnetic separator disposed adjacent the vibrating feeder.

19. A method for providing coal of a desired particle size comprising the steps of:

producing a first stream of grindable particles and at least a second stream of particles with Hardgrove grindabilities at least 10% less than that of the first stream;

directing the first stream away from the pulverizer;

directing the second stream to a separation mechanism to further sort the second stream; and

returning to the pulverizer a desirable component separated from the second stream and rejecting an undesirable component.

20. A method as described in Claim 19 wherein the producing step includes the step of concentrating the particles with Hardgrove grindabilities at least 10% less than that of the feed particles in the pulverizer.

21. A method as described in Claim 20 wherein the producing step includes the step of producing the first stream primarily of coal of the desired particle size and producing the second stream primarily of ash-forming minerals.

22. A method as described in Claim 21 wherein after the second stream directing step, there is the step of returning the coal of low ash and low sulfur produced by the separation mechanism back to the pulverizer.

23. A method as described in Claim 22 wherein the ash-forming minerals include iron pyrite.

24. A method as described in Claim 23 wherein the producing step includes the step of introducing air flow with a blower into the pulverizer.

25. A method as described in Claim 24 wherein the second stream directing step includes the step of rejecting directly all the particles in the second stream.

26. A method as described in Claim 25 wherein the producing a second stream step includes the step of screening coarse particles from the stream of less grindable particles separated from the pulverizer.

27. A method as described in Claim 26 wherein the producing step includes the step of producing the first stream

primarily of coal of the desired particle size and producing the second stream primarily of minerals including mercury, arsenic and selenium.

28. An apparatus for separating undesired material from desired material of a mixture comprising:

a fluid swept comminutor for breaking up the mixture; and

a separation mechanism connected to the comminutor for separating undesired material from desired material.

29. An apparatus as described in Claim 28 wherein the comminutor includes a feed mechanism which introduces the mixture into the comminutor.

30. An apparatus as described in Claim 29 wherein the comminutor includes a fluid blower which introduces flowing fluid into the comminutor.

31. An apparatus as described in Claim 30 wherein the comminutor includes a removal mechanism which removes undesired material and desired material from the comminutor.

32. An apparatus as described in Claim 31 including a mechanism for direct rejection of material removed from the comminutor without further processing.

33. An apparatus as described in Claim 32 wherein the separation mechanism includes a conveyor which carries undesired material from the removal mechanism.

34. An apparatus as described in Claim 33 wherein the separation mechanism includes a surge bin disposed adjacent the conveyor into which the undesired material and desired material is deposited from the conveyor.

35. An apparatus as described in Claim 34 wherein the comminutor includes a grinding chamber.

36. An apparatus as described in Claim 35 wherein the comminutor includes intermediate openings through which the removal mechanism removes undesired material and desired material from the comminutor.

37. An apparatus as described in Claim 36 wherein the comminutor has a complete opening from which particles of a desired particle size leaves the comminutor.

38. An apparatus as described in Claim 37 wherein the comminutor includes a removal mechanism for separating particles from the lowest elevation in the comminutor.

39. An apparatus as described in Claim 38 wherein the comminutor includes a particle size classifier.

40. An apparatus as described in Claim 39 wherein the removal mechanism includes kick-out door mechanisms to remove material around the outside walls of the classifier at elevations above the grinding chamber but below the feed mechanism's entrance to the classifier.

41. An apparatus as described in Claim 40 wherein the separation mechanism includes a size classification mechanism disposed under the surge bin for screening material.

42. An apparatus as described in Claim 41 wherein the separation mechanism includes a vibrating feeder disposed under the screen on which material is deposited after passing through the screen.

43. An apparatus as described in Claim 42 including a mechanism for directly rejecting oversized material from the screen or sending it back to the pulverizer.

44. An apparatus as described in Claim 43 wherein the separation mechanism includes an electric and magnetic separator disposed adjacent the vibrating feeder.

45. An apparatus as described in Claim 44 including a mechanism for returning the desirable material from the separator back to the pulverizer and rejecting the undesirable material, the returning mechanism disposed adjacent the separator and the pulverizer.

46. A method for providing particles of a desired particle size comprising the steps of:

producing a first stream of particles and at least a second stream of particles with Bond Work Indices at least 10% higher than that of the first stream of particles with a comminutor;

directing the first stream away from the comminutor;

directing the second stream to a separation mechanism to further sort the second stream; and

directing the particles of lower Bond Work Indices back to the pulverizer and rejecting particles with Bond Work Indices of at least 10% higher.

47. A method for separating a mixture of coarse particles comprising the steps of:

feeding the mixture of coarse particles to a comminutor;

grinding the mixture to reduce particle size;

concentrating abrasive particles inside the comminutor;

removing the abrasive particles from the inside of the comminutor;

separating abrasive particles removed from the comminutor;

returning component with abrasion index 10% or less to the comminutor;

producing a product consisting of smallest particles which is enriched in less abrasive component, and

producing a second product consisting of intermediate size particles which are enrich in abrasive component.